CLAIMS

What is claimed is:

1. An electron emitter comprising:

a p region;

a dielectric layer formed above said p region; and

a metallic layer formed above said dielectric layer.

2. The electron emitter according to claim 1, further comprising:

a substrate below said p region.

3. The electron emitter according to claim 1, wherein said p region is formed from a semiconductor.

4. The electron emitter according to claim 3, wherein said semiconductor includes at least one of Si, Ge, GaP, InP, InGaAs, and InGaP.

5. The electron emitter according to claim 3, wherein hole concentration level of said p region ranges substantially between 10^{16} and 10^{19} cm^{-3}

6. The electron emitter according to claim 1, further comprising:

a p electrode formed above and making electrical contact with said p region.

7. The electron emitter according to claim 1, further comprising:

an M electrode formed above and making electrical contact with said metallic layer.

8. The electron emitter according to claim 1, further comprising:

an n+ region formed above a substrate such that said p region is formed within said n+ region.

9. The electron emitter according to claim 8, wherein an electron concentration level of said n+ region is greater than a hole concentration level of said p region.

10. The electron emitter according to claim 8, wherein said n+ region is formed from materials with wider band gap than said p region.

11. The electron emitter according to claim 8, wherein a thickness of said p region is less than a diffusion length of non-equilibrium electrons in said p region.

12. The electron emitter according to claim 8, wherein a thickness of said metallic layer is on the order of or less than a mean free path for electron energy.

13. The electron emitter according to claim 8, further comprising:

an n electrode formed above and making electrical contact with said n+ region.

14. The electron emitter according to claim 1, wherein said metallic layer 240 is formed from materials including at least one of Au, Ag, Al, Gd, W, Pt, Ir, Pd, and alloys thereof.

15. A method to fabricate an electron emitter, comprising:

forming a p region;

forming a dielectric layer above said p region; and

forming a metallic layer above said dielectric layer.

16. The method to fabricate an electron emitter of claim 15, according to claim 15, further comprising:

forming said p region above a substrate.

17. The method to fabricate an electron emitter according to claim 15, further comprising:

forming an n+ region above a substrate such that said p region is formed within said n+ region.

18. The method to fabricate an electron emitter according to claim 18, further comprising:

forming an n electrode above and making electrical contact with said n+ region.

19. The method to fabricate an electron emitter according to claim 15, further comprising:

forming a p electrode above and making electrical contact with said p region.

20. The method to fabricate an electron emitter according to claim 15, further comprising:

forming an M electrode above and making electrical contact with said metallic layer.